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Service failure and recovery in using technology-based self-service: effects on user attributions and satisfaction

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This study examines service failure and recovery in using technology-based self-service (TBSS) systems to determine the effects of a variety of relevant factors on negative customer/user attributions to the service provider, to employees who try to help in recovery, and to the technology itself, as well as the effects on customer/user satisfaction with the failure/recovery experience. The findings show that immediate recovery of TBSS failures reduces negative attributions and increases customer/user satisfaction with the experience, as does a low-anxiety environment around the kiosk. Technology error (as opposed to user error) decreases user satisfaction. Employee assistance decreases negative attributions to the employee but increases negative attribution to the technology. Some interactions were found among the experimental factors that are also meaningful.

Keywords: service failure; service recovery; technology-based self-service; customer satisfaction

Introduction

Technology-based self-service (TBSS) solutions have become a common sight within retail environments. Applications such as checkout self-scanners, photo processing kiosks, and video rental stations give retailers the ability to offer fast, consistent, and accurate service to consumers (Marigny Research Group, Inc., 2008). The amount spent on technologies that support TBSS solutions has reached \$3.2 billion, with expected growth to \$5.8 billion by 2013 (Rajagopalan, 2010; VDC Research, 2010). In turn, consumers have embraced TBSS options for the additional convenience, control, and privacy that they offer (Self-Service & Kiosk Association, 2009). Yet, failures are a common occurrence in typical self-service options based on technology (Meuter, Ostrom, Roundtree, & Bitner, 2000). But research on this issue has not gone far enough to determine the negative effects of such failures and how they can be managed.

Research on service failures, in general, has noted that failed encounters lead to negative attribution (Hui & Toffoli, 2002), and research on TBSS failures has found that they are viewed as dissatisfying incidents (Meuter et al., 2000). Other research has shown that compensation by employees after TBSS failures is not as effective as that for employee-caused service failures (Mattila, Cho, & Ro, 2011) and that customers who participate in the recovery of TBSS failures experience greater satisfaction (Dong, Evans, & Zou, 2008). Whereas these studies offer a good start on this topic, no research has been done on other highly relevant issues such as (1) recovery from failure *during* rather than *after* TBSS use,

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(2) employee assistance in fixing TBSS failures *right when* they occur, (3) the source of TBSS failures (i.e. caused by the technology versus the customer/user), and (4) the environment around the TBSS in terms of creating or reducing anxiety. Moreover, although Iglesias (2009) has examined failure attributions to the service provider in terms of locus of causality (employee versus firm), no study has investigated attributions to multiple sources associated with service providers of TBSS – such as the store, its employees, and the technology itself – although such research could be insightful in understanding how customers or users react to TBSS failures and recovery. Researchers do agree that recovery is difficult in the case of TBSS failures (Dong et al., 2008; Mattila et al., 2011; Meuter et al., 2000) and that more research is needed to figure out solutions and insights for this phenomenon.

Related to the lack of comprehensive research on TBSS failures, it is worth noting that recently a new form of TBSS, henceforward termed as ‘confidential TBSS’, has found its way into retail environments. Confidential TBSS systems are designed to collect, manage, and store personal customer/user information. Existing applications of such systems include job recruitment, government services, employment benefits, and healthcare, where requests for personal histories, personal identifiers (e.g. social security and driver’s license numbers), and medical information are common, leading to greater concern about their operational consistency. Anecdotal evidence suggests that technological errors often occur in the use of confidential TBSS systems, leading to what is perceived by users as serious service failures. However, despite the growth of these systems and the problems inherent in their nature, confidential TBSS systems have not received any attention from researchers.

In response to the substantive concerns related to TBSS failures, in general, and confidential TBSS failures, in particular, as well as to address the gaps in the literature summarized above, this study aims to determine the factors that reduce negative attributions made by customers/users who experience TBSS failures to various targets associated with the service provider. It also aims to reveal the factors that increase customer/user satisfaction with the TBSS failure/recovery experience.

Conceptual framework

Recovery from TBSS failure

Past research on TBSS and online failures has looked at ‘recovery’ as compensation or apologies offered to the customer *after* the failure. For example, Holloway and Beatty (2003) noted that recovery attempts made after online service failures (a special case of TBSS failures) were typically ineffective. Similarly, Mattila et al. (2011) found that recovery efforts such as compensation or apologies by employees had little effect when offered after TBSS failures. Therefore, the present research focuses instead on ‘recovery’ as ‘immediate problem resolution’ or resolving the failure when it occurs, that is, *during* use of the TBSS, rather than on attempts at recovery after a failure has occurred and not been resolved. Recovery that fixes the problem, in other words, is likely to have far more positive outcomes and direct managerial implications, but this view has not been taken in past research on TBSS failure and recovery.

Two relevant consequences of recovery are the effects on customer/user attributions to the service provider and customer/user satisfaction. To properly investigate the effects of recovery in terms of problem resolution, attribution to the service provider is also viewed in relation to problem resolution, that is, who is blamed for the lack of recovery (or

credited with the recovery), and satisfaction is viewed in relation to the failure/recovery experience.

The attribution literature suggests that when failures occur, individuals often engage in 'spontaneous causal thinking' (Weiner, 1985) or attributions in order to 'achieve a greater degree of understanding of, and hence control over, their environment' (Harvey & Weary, 1984, p. 428). At the same time, causal attribution for both positive and negative experiences with product and services has been well documented (Folkes, 1984; Folkes, Koletsky, & Graham, 1987). Thus, attributions do not apply only to failures; they also apply to recovery. In other words, failures may cause negative attributions, but recovery and other suitable conditions can reduce these negative attributions and create positive outcomes, such as satisfaction.

Folkes (1984) and Folkes et al. (1987) found that customers' negative (positive) experiences led to negative (positive) attributions to the product or service in question. In a study on attributions made by home sellers to their real estate agents, Dabholkar and Overby (2006) found that whereas an unfavorable service outcome (such as taking a long time to sell the house) could lead to negative attributions to the agents, changing the outcome to a favorable one (such as eventually selling the house at a good price) could create positive attributions or, at the very least, reduce negative attributions. This background is analogous to service failure and recovery. Given how frustrating a TBSS failure can be for a customer or user, recovery, especially *during* the failure, can be expected to reduce any negative attributions that had been created toward the service provider, its employees, and the technology itself. Therefore, it is proposed that

H1: Recovery (as in immediate problem resolution) from a TBSS failure (versus no recovery) will be associated with lower negative attributions by the customer or user to (a) the technology (or kiosk), (b) any employee who tries to assist in recovery, and (c) the store or retailer.

Similarly, whereas research suggests that TBSS failures reduce satisfaction (Meuter et al., 2000), it has been shown that encounters where service failures are recovered (whether the failures involved TBSS or not) lead to higher levels of satisfaction (Andreassen, 2000). One would expect that this effect would be even more pronounced when the recovery fixes the problem *during* TBSS use rather than at a later time. Thus, it is proposed that

H2: Recovery (as in immediate problem resolution) from a TBSS failure (versus no recovery) will be associated with greater customer or user satisfaction with the experience.

Anxiety caused by the TBSS environment

Research has shown repeatedly that in-store anxiety, caused by crowding or the presence of other customers, lowers service evaluations by customers (Argo, Dahl, & Manchanda, 2005; Hui & Bateson, 1991; Langer & Saegert, 1977). Similar effects have been found in the TBSS literature as well, with respect to anxiety created by crowding around an in-store kiosk (Dabholkar & Bagozzi, 2002). However, anxiety caused by an in-store environment has not been studied in a TBSS failure and recovery context. Yet, it seems intuitive that this type of anxiety can affect customer or user attributions and satisfaction in a TBSS failure/recovery situation.

Attribution literature has shown that variations in attribution are influenced by changes in perceived control (Pittman & Pittman, 1980); the less (more) the control, the more (less) the negative attribution. Applying this theoretical foundation to the context under study, a TBSS failure may in itself create a sense of a loss of control. Anxiety caused by the

environment of the TBSS could further exacerbate this feeling of being out of control. Thus, negative attributions arising from the TBSS failure could worsen with an environment that creates anxiety through the location of a kiosk, store crowding, lack of privacy, or noise. Facing a TBSS failure in such an environment, the customer or user will be more likely to make negative attributions to the service provider, its employees, and the technology. On the other hand, if there is little anxiety in the environment around the kiosk, the customer or user will feel less out of control, and negative attributions (arising from the failure) to all the relevant parties associated with the service provider will be lower. Therefore, it is proposed that

H3: A low-anxiety environment around the kiosk (versus a high-anxiety environment) in a TBSS failure/recovery situation will be associated with lower negative attributions by the customer or user to (a) the technology (or kiosk), (b) any employee who tries to assist in recovery, and (c) the store or retailer.

Extending the research on anxiety caused through in-store crowding (e.g. Dabholkar & Bagozzi, 2002; Hui & Bateson, 1991) to include anxiety caused by the location of the kiosk, lack of privacy, or noise in the environment of the TBSS, it follows that the customer/user in a TBSS failure/recovery situation is more likely to be dissatisfied in a high-anxiety environment, and the opposite will be true for a low-anxiety environment. Thus, it is proposed that

H4: a low-anxiety environment around the kiosk (versus a high-anxiety environment) in a TBSS failure/recovery situation will be associated with greater customer or user satisfaction with the experience.

Source of error

Meuter et al. (2000) have reported that customers admitted to sometimes being the cause of TBSS failures. But no research has systematically examined TBSS failures caused by customers. Given the nature of the phenomenon, a TBSS failure can be caused by only two sources: the technology itself and the customer/user. Hence, it would be useful to understand how technology errors versus user errors affect attributions and satisfaction in TBSS failure/recovery situations.

Past research has found that attributions are more likely to occur for unexpected events (Pyszczynski & Greenberg, 1981). With advances in TBSS systems in recent times, individuals who use such systems typically would not expect them to malfunction. Therefore, when the system does not work, the resulting TBSS failure would be an unexpected event to the user, making negative attributions to the kiosk and the store even more likely. (One would not expect a customer or user of TBSS to blame kiosk errors on a store employee, whereas the store could be viewed as responsible.) Moreover, literature on technology failures shows that customers realize that some of the problems in using technology arise with themselves and they are ready to share the blame (Harris, Mohr, & Bernhardt, 2006; Meuter et al., 2000). Therefore, if the failure is due to the user's own error, the user will likely accept some of the blame and his/her attributions to the kiosk and the store will be less negative than in the case of a kiosk error. Based on this background, it is proposed that

H5: A TBSS failure caused by a kiosk error (instead of by customer or user error) will be associated with greater negative attributions to (a) the kiosk and (b) the store or retailer.

Research on service failures, in general, not on TBSS, has found that if the failure is seen as the firm's fault, customer satisfaction is lower (Iglesias, 2009). In other words, it is a matter of controllability from the customer's perspective, which can be extended to TBSS failures. A technology error can be seen as the service provider's responsibility and this would lead to lower satisfaction for the customer or user. Therefore, it is proposed that

H6: A TBSS failure caused by a kiosk error (instead of by customer or user error) will be associated with lower customer or user satisfaction with the experience.

Employee assistance

Previous research has examined the role of employees in offering compensation for a TBSS failure versus an employee-generated failure (Mattila et al., 2011) and found that it is not very effective in the case of TBSS failures. It is striking that no study has investigated how customers react when employees try to help them recover from a TBSS failure *during its use* (as in immediate problem resolution), even though offering such employee assistance is clearly within the scope of actionable strategies for a service provider.

Hui and Toffoli (2002) found that lack of control leads to increased negative attribution. But Pittman and Pittman (1980) reported that such negative attribution is reduced when perceived control increases. In the case of a TBSS failure, if an employee assists the user to try to resolve the failure, the user will perceive more control in the situation than if s/he is left alone to deal with the failure. This, in turn, will reduce the user's negative attributions to the employee. At the same time, when offered employee assistance, the user will be likely to increase negative attributions to the kiosk, either because the kiosk generated the error or because it was unable to fix an error that the user generated. In either case, an employee was needed to resolve a 'self-service' situation, which would increase the negative attributions the user would make to the kiosk. (Given the two opposing effects on negative attributions – to the employee versus to the kiosk – it is not possible to predict the direction of the user's attributions to the store or the level of user satisfaction, when employee assistance is offered.) Therefore, it is proposed that

H7: Employee assistance when a TBSS failure occurs (versus no assistance) will be associated with (a) lower negative attribution to the employee and (b) greater negative attribution to the kiosk.

The entire conceptual model, with *H1–H7*, is shown in Figure 1.

Methodology

Research context

In selecting a TBSS context, it was decided to choose 'confidential' TBSS systems (defined earlier) partly because these systems have not received any attention from scholars despite their growing importance and also because all the proposed hypotheses are very relevant for such a context. In particular, job recruitment kiosks were chosen as the specific research context for this study for the following reasons.

First, job recruitment kiosks are being widely used today and represent the vast majority of confidential TBSS systems and 15% of all TBSS systems (Edgell Communications, 2007). In fact, their use is expected to keep growing because they offer greater consistency of applicant information and security through instant background checks (Dixon, 2003) and because they have provided bottom-line improvements for retailers

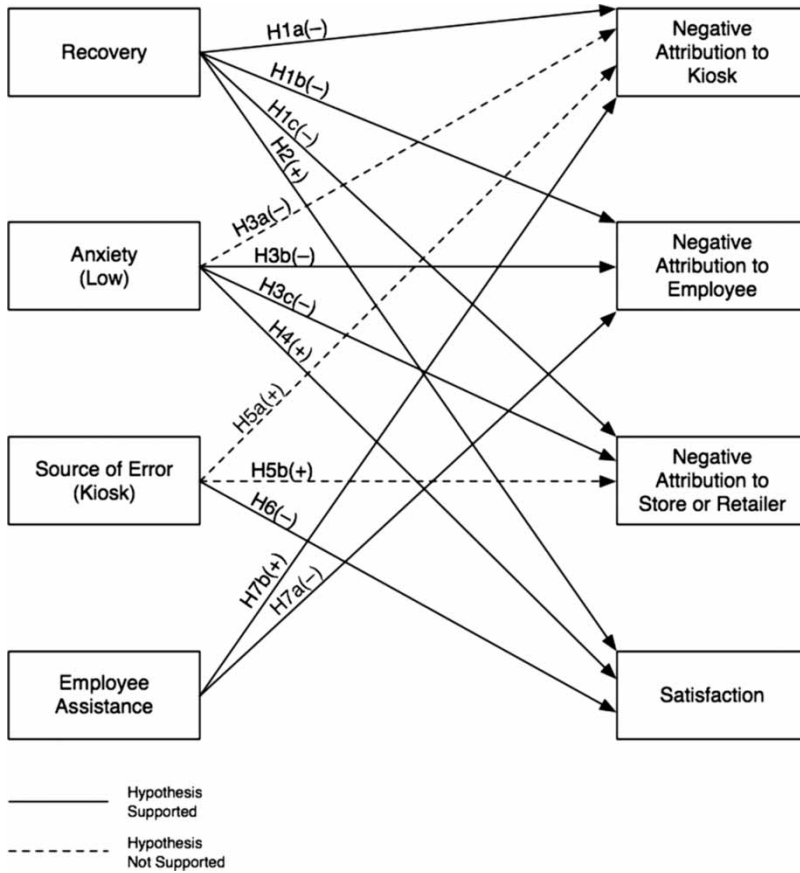


Figure 1. Conceptual model.

in terms of employee turnover, job performance, and product knowledge as a result of pre-screening (Kiosk Information Systems, 2006).

Second, job recruitment kiosks often experience technological problems ranging from small software bugs to catastrophic hardware failures (Self-Service & Kiosk Association, 2009), making failure/recovery a real issue for this TBSS context.

Third, technology failures in the use of job recruitment kiosks are often exacerbated when store employees are not available to help kiosk users, making the issue of employee assistance highly relevant. Kiosk placement also makes this context relevant. Some stores place job recruitment kiosks in noisy and crowded areas, making the issue of anxiety created by the kiosk environment highly relevant for this context. Other stores place these kiosks in isolated locations, making it difficult to reach an employee for assistance if a technology failure occurs and creating issues of employee assistance as well as anxiety that are examined in this study.

Experimental design

A laboratory experiment was used in order to carefully control four factors in the context of TBSS failure/recovery: failure recovery (as in immediate problem resolution), anxiety level (due to the kiosk environment), source of failure, and employee assistance.

The objective of the experiment was to test the effects of these four factors on negative user attributions to various targets associated with the service provider and on user satisfaction with the failure/recovery experience. A scenario-based approach was used to create a realistic situation, where the individual walks into a store and sits down at a job recruitment kiosk. In filling out the application on the kiosk, an error occurs.

A 2⁴ factorial experimental design was used (see Appendix 1), where each factor had two possible levels. *Failure recovery* could occur or not occur, that is, either recovery, as in immediate problem resolution, was achieved or the error remained unresolved. Recovery from the failure could be achieved by an employee or by the system itself. *Anxiety level (due to the kiosk environment)* was manipulated as high or low based on a number of statements about the location of the kiosk in terms of noise and traffic as well as phone availability to call for assistance. High-anxiety scenarios described the job recruitment kiosk as being situated in a noisy, high-traffic area of the store with no phone available to call for help if needed, while low-anxiety scenarios described the kiosk as being located in a quiet, out-of-the-way area, with a phone handy to call for assistance if needed. The *source of failure* could be the kiosk or the user, that is, the failure could arise as a result of a malfunction of the kiosk or an error generated by the user. *Employee assistance* could be present or not, that is, either an employee helped the user (whether or not recovery took place) or no employee showed up to help.

Sample

A student sample was deemed ideal for this study, given the high familiarity students have with the use of TBSS, in general, and because job recruitment kiosks are often found in retail locations where seasonal employment of college-age individuals is common. As a result, many college students have actually used job recruitment kiosks in stores and know what is involved and the kind of frustrations that can occur.

A total of 408 undergraduate US students were invited to take the survey. Although participation was voluntary, a large number of students (370) completed the survey and only two surveys were discarded due to incomplete responses. This resulted in a sample size of 368 and a response rate of 90.2%. Of the 368 surveys, 66% reported experience with a kiosk system similar to that described in the scenario, and 24% of those reported encountering problems during the use of such kiosks. Participant gender was evenly distributed with 52% males and 48% females. The average age of participants was 21.9 years.

Procedure

An Internet-based survey was used to collect data. This type of survey was chosen to allow participants to respond at their convenience and to prevent their looking back at the scenario to answer questions regarding manipulation checks. Participation was voluntary and respondents received a small amount of extra credit for their classes. Emails with a web link to the survey were sent out and a one-week period was provided for the completion of the survey.

Each participant received a randomly selected scenario that described an experience using a job recruitment kiosk in a retail store. The 16 scenarios were equally distributed among the respondents to achieve evenly filled cells in the research design (see Appendix 1). After reading the scenario, participants answered questions related to their satisfaction with the failure/recovery experience and about attributions they would make to various targets based on the failure/recovery situation.

Measurement

Realism checks were used to capture the level of realism of the scenarios. Two validated, seven-point Likert items were taken from Dabholkar (1994).

Manipulation checks for the four experimental treatments were developed as dichotomous items. These items forced participants to choose one of two options to describe each of the four conditions of the scenario they had read, but to which they no longer had access.

Attribution was measured by asking participants the extent to which the three targets (kiosk, employee, and store) were responsible for the lack of recovery (or problem resolution) from the failure. Including three targets is similar to the locus of causality approach followed by Iglesias (2009) in measuring whether respondents attributed a service failure in a bank to the employee or to the bank. For each target, two seven-point Likert items were used. The first item asked the extent to which respondents thought that different targets associated with the service were responsible for the lack of recovery from the failure and thus captured negative attribution directly. The second item was reversed to focus on attributions for recovery, thus allowing a full range of attributions.

Satisfaction was captured with five seven-point Likert items adapted from Dabholkar and Thorpe (1994) and van Dolen, Dabholkar, and de Ruyter (2007). All measures are reported in Appendix 2.

Results

Realism checks

Participants were asked about the realism of the scenario and whether they could imagine themselves in such a situation. The average for the two scales was 5.58 (on a seven-point scale), showing a high perception of realism.

Manipulation checks

Chi-square tests were run to verify the manipulation checks for the four experimental treatments (failure recovery, anxiety level, source of failure, and employee assistance). All tests were supported.

For *failure recovery*, 130 respondents (71.0%) correctly identified that there was no recovery, and 153 (82.7%) correctly identified that there was recovery ($\chi^2 = 107.82$, $p < 0.001$). For *anxiety level*, 145 respondents (78.4%) correctly identified their scenario as a low-anxiety situation, and 153 (83.6%) correctly identified it as a high-anxiety situation ($\chi^2 = 141.73$, $p < 0.001$). For *source of failure*, 126 respondents (68.9%) correctly identified that the error originated from the user, that is, themselves, and 166 (89.7%) correctly identified that it originated from the kiosk ($\chi^2 = 132.23$, $p < 0.001$). For *employee assistance*, 155 respondents (84.2%) correctly identified that they received no employee assistance, and 156 (84.8%) correctly identified that they received employee assistance ($\chi^2 = 175.32$, $p < 0.001$). Thus, all four experimental treatments or manipulations appeared to have worked well.

Measure validity

Exploratory factor analysis found four separate factors as expected (satisfaction and negative attribution to the store, employee, and kiosk), with item loadings ranging from 0.55 to 0.92 and explaining 80.14% of the variance. In terms of reliability, Cronbach's alpha was 0.87 for negative attribution to the employee and 0.77 for negative attribution

to the store. Thus, these two constructs had fairly high reliability. For negative attribution to the kiosk, Cronbach's alpha was only 0.49, and therefore, only one item was used in subsequent analysis and it was robust enough to work well in all the analyses. Cronbach's alpha was 0.93 for the satisfaction construct, showing very high reliability.

Effects of experimental treatments

MANOVA was run to test all the hypotheses. However, simply having a significant main effect was not taken as sufficient support for any given hypothesis. Estimated marginal means were examined for the two conditions in each manipulation to determine whether they were in the right direction as proposed in the hypotheses.

Attribution to the kiosk

The main effects included recovery $F(1,352) = 34.35, p < 0.001$; source of error, $F(1,352) = 11.10, p < 0.001$; and assistance, $F(1,352) = 29.50, p < 0.001$. Thus, *H1a*, *H5a*, and *H7b* (the effects of recovery, source of error, and assistance on attribution to the kiosk) appeared to be supported, while *H3a* (effect of anxiety) was not supported. On examining the estimated marginal means, two sets of means were in the correct direction, indicating (1) less negative attribution to the kiosk with recovery (5.17) versus no recovery (6.00) in support of *H1a* and (2) more negative attribution to the kiosk with assistance (5.97) versus no assistance (5.20) in support of *H7b*. However, estimated marginal means were in the opposite direction as predicted by *H5a*, indicating less negative attribution to the kiosk with kiosk error (5.35) versus user error (5.82). Thus, *H1a* and *H7b* were fully supported, but despite the significant main effect, *H5a* was not supported.

Attribution to the employee

The main effects included recovery $F(1,352) = 65.80, p < 0.001$; anxiety, $F(1,352) = 7.90, p < 0.01$; and assistance, $F(1,352) = 229.60, p < 0.001$. Thus, *H1b*, *H3b*, and *H7a* (the effects of recovery, anxiety, and assistance on attribution to the employee) appeared to be supported. On examining the estimated marginal means, all three sets of means were in the correct direction, indicating less negative attribution to the employee with (1) recovery (3.94) versus no recovery (5.07) in support of *H1b*, (2) low anxiety (4.31) versus high anxiety (4.70) in support of *H3b*, and (3) assistance (3.45) versus no assistance (5.56) in support of *H7a*. Thus, *H1b*, *H3b*, and *H7a* were fully supported.

Attribution to the store

The main effects included recovery $F(1,352) = 106.87, p < 0.001$, and anxiety $F(1,352) = 29.35, p < 0.001$. Thus, *H1c* and *H3c* (the effects of recovery and anxiety on attribution to the store) appeared to be supported. On examining the estimated marginal means, both sets of means were in the correct direction, indicating less negative attribution to the store with (1) recovery (3.50) versus no recovery (4.97) in support of *H1c* and (2) low anxiety (3.85) versus high anxiety (4.62) in support of *H3c*. Thus, *H1c* and *H3c* were fully supported. As no main effect was found for source of error, *H5b* was not supported.

Satisfaction

The main effects included recovery $F(1,352) = 107.60, p < 0.001$; anxiety $F(1,352) = 39.45, p < 0.001$; and source of error, $F(1,352) = 4.17, p < 0.05$. Thus, $H2, H4,$ and $H6$ (the effects of recovery, anxiety, and assistance on satisfaction) appeared to be supported. On examining the estimated marginal means, all three sets of means were in the correct direction, indicating more satisfaction with (1) recovery (3.79) versus no recovery (2.67) in support of $H2$, (2) low anxiety (3.57) versus high anxiety (2.88) in support of $H4$, and (3) user error (3.32) versus kiosk error (3.13) in support of $H6$. Thus, $H2, H4,$ and $H6$ were fully supported.

Figure 1, depicting the conceptual model, also displays which of the hypotheses are supported and which are not. It is seen that out of a total of 13 hypotheses (counting sub-hypotheses separately), 10 were supported.

Interaction effects

Although not hypothesized, some interesting interaction effects were found as well. In the MANOVA for attribution to the kiosk, there was an interaction between recovery and assistance, $F(1,352) = 4.73, p < 0.05$ (Figure 2(a)). In the MANOVA for attribution to the employee, there was again an interaction between recovery and assistance, $F(1,352) = 46.20, p < 0.001$ (Figure 2(b)). In the MANOVA for attribution to the store, there

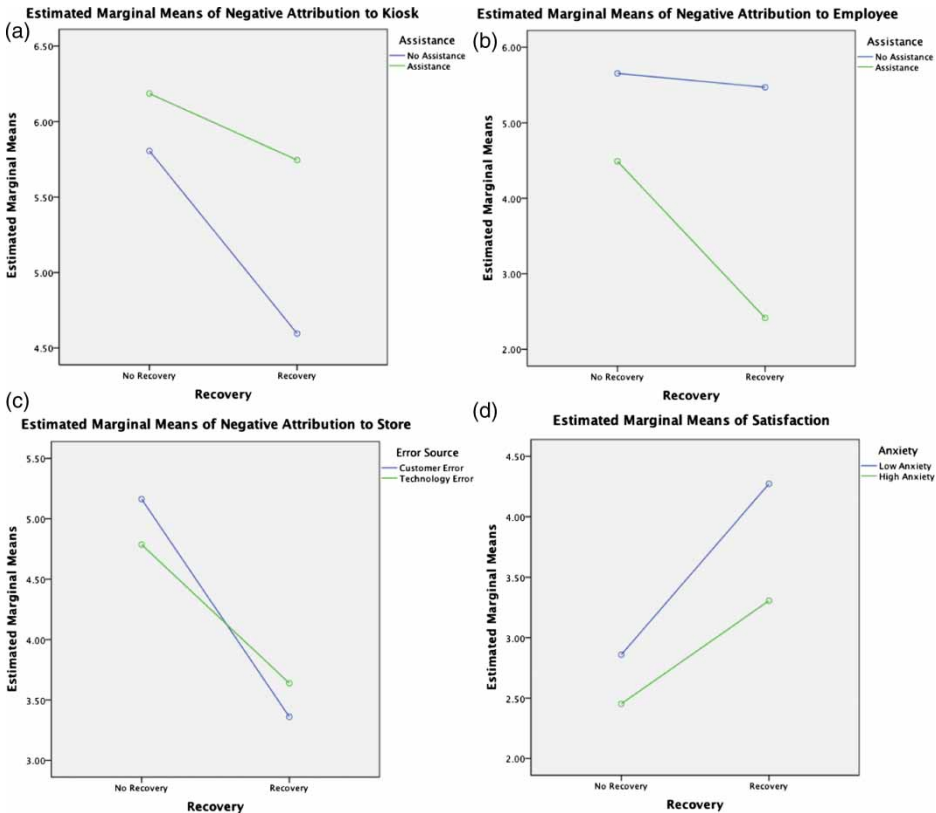


Figure 2. Interactions among factors in the experimental design.

was an interaction between recovery and source of error $F(1,352) = 5.26, p < 0.05$ (Figure 2(c)). In the MANOVA for satisfaction, there was an interaction between recovery and anxiety, $F(1,352) = 6.55, p < 0.05$ (Figure 2(d)).

The interaction effect shown in Figure 2(a) implies that the effect found in *H1a* (negative attribution to the kiosk is lower for recovery versus no recovery) is enhanced when there is *no* employee assistance. This effect appears to be related to the thinking that users typically prefer not to seek assistance in a 'self-service' situation.

In contrast, the interaction effect shown in Figure 2(b) shows that the effect found in *H1b* (negative attribution to the employee is lower for recovery versus no recovery) is enhanced when there *is* employee assistance. A reason for this effect may be that users recognize that the employee has helped them recover from a frustrating situation and this considerably decreases their negative attribution to the employee.

The interaction effect shown in Figure 2(c) suggests that the effect found in *H1c* (negative attribution to the store is lower for recovery versus no recovery) is different for the source of error depending on whether there is recovery or not. If there is recovery, negative attributions to the store are lower for user error, but if there is no recovery, negative attributions to the store are greater for user error. This complex effect is possibly due to the user's genuine appreciation of the store for recovering from an error that the user created, coupled with somewhat unreasonable annoyance at the store for not having a system in place that could recover from an error the user created.

Lastly, the interaction effect shown in Figure 2(d) indicates that the effect found in *H2* (satisfaction is higher for recovery versus no recovery) is enhanced under conditions of low anxiety. This is logical because any TBSS user would be more satisfied with a low-anxiety situation, especially in a failure/recovery situation.

Discussion

Theoretical implications

This study extends the literature on attribution and satisfaction in the TBSS failure/recovery context through findings that either support or contradict extant research, as discussed in detail below. As a whole, this study sheds light on how a variety of factors affect user attributions and satisfaction in a TBSS failure/recovery context and builds theory in an area not yet researched, that is, the confidential TBSS context – where factors such as recovery, anxiety, employee assistance, and source of error may be even more critical.

Previous research on TBSS and online failures studied recovery as compensation or apologies *after* the TBSS or online failure occurs and found recovery to be relatively *ineffective* (e.g. Holloway & Beatty, 2003; Mattila et al., 2011) or *unimportant* to users (e.g. Harris et al., 2006). In contrast to extant research, this study viewed recovery as immediate problem resolution *during* TBSS use and found recovery to be *important* to users and *effective* in reducing negative attributions and increasing satisfaction.

Specifically, as proposed, this type of basic recovery, which fixes the problem even while the customer is using the TBSS, lowers negative attributions made by the customer/user to the kiosk, to an employee who helps, and to the store and increases customer/user satisfaction with the failure/recovery experience. Previous research on TBSS failure and recovery (e.g. Holloway & Beatty, 2003; Mattila et al., 2011) did not find effective ways for employees or technology to deal with TBSS failures. In contrast, this study shows that important outcomes (such as reducing negative attributions and increasing satisfaction) can be achieved simply by ensuring that the failure is resolved on the spot, whether by the employee or the technology itself.

In addition, it was found that a low-anxiety environment around the kiosk lowers negative attributions made by the customer/user to an employee who tries to help and to the store and increases customer/user satisfaction with the failure/recovery experience. A low-anxiety environment does not, however, reduce negative attributions to the kiosk. An explanation may be that people realize that the kiosk is not at fault (or to be credited) if the environment around it creates anxiety (or does not), but they can blame (or credit) the employee or the store for the same. Dabholkar and Bagozzi (2002) had shown the importance of a low-anxiety environment in encouraging customers to choose a TBSS over a full-service option. This study takes this past research further to show the importance of a low-anxiety environment in a failure/recovery situation involving TBSS.

The source of error did not act entirely as expected. In one case, results were in the opposite direction, where user error was found to increase negative attributions to the kiosk. The rationale had been that users may accept some blame if they create the error and not hold it against the technology. This does not seem to be the case. In a second instance, there was a non-significant effect for attribution to the store, showing no difference as a result of user or kiosk error. A third result did show lower satisfaction with kiosk error, as proposed, but the difference in the means was slight, showing minimal practical significance. These results taken together suggest that users are *not* too concerned about *how* the error arises and do not find it worthwhile to make attributions to the store based on the source of failure; they just want the problem to be fixed. Meuter et al. (2000) had found that customers had a slight tendency to blame the provider for technology failures but that some customers were ready to accept blame as well. Our study supports the slight tendency found in past research to blame providers for technology failures but also shows that today's TBSS users tend to look beyond who created the technical error and instead focus on getting it resolved.

This study has also found that employee assistance in dealing with the failure reduces negative attributions made by the customer/user to the employee but increases negative attributions to the kiosk. As mentioned above, Meuter et al. (2000) had found a slight tendency for customers to blame the provider for technology failures. This study sheds further light on that research by clarifying that whereas users tend to blame the technology for a failure (and so may blame the provider as well if no help is offered), they compensate by crediting the employee who tries to help. In fact, as proposed in this study, the two effects cancel each other out, so there is no net negative attribution from the user to the store in such a case. Moreover, past research (e.g. Dabholkar, 1996) had found that TBSS users often choose TBSS to avoid interaction with employees. In contrast, this study shows that TBSS users faced with a technology failure are open to employee assistance despite the 'self-service' aspect and tend to reduce their negative attributions when offered such help.

Another contribution of this study relates to the measures developed for negative attribution. Previous research (e.g. Dong et al., 2008; Iglesias, 2009) has looked at negative attributions for the *service failure itself*. In contrast, this study captures negative attributions for the *lack of recovery from the failure, with an allowance for reductions in negative attributions in the case of recovery from failure*. The first aspect suggests a similarity to Maxham and Netemeyer's (2002) study for double service failures, but their items (also used by Dong et al., 2008) *capture only attributions for failure* and these are simply presented twice to the respondents. In contrast, the present study goes further by *capturing attributions for recovery as well as lack of recovery from failure and thus reveals a full range of attributions made by users to various targets associated with the service provider*.

Measuring only attributions for failure (as done in past research) would be similar to the manipulation checks for source of error in this study and would limit the implications of this study to simply focusing on who or what caused the failure. Instead, *this study not only looks at who or what caused the failure but also looks at who or what can be credited with recovery or blamed for lack of recovery.*

Managerial implications

Past research (e.g. Meuter, Ostrom, Bitner, & Roundtree, 2003) has called for greater customer input in the development and testing of TBSS systems so that businesses can better understand the impact that technology and situational factors have on TBSS use and satisfaction. This is even more important with confidential TBSS systems, given the sensitivity of the information shared and stored. Our study, using an experimental design incorporating several relevant factors and a sample with a large number of experienced users, has made a good start in this direction. As a result, our findings have several implications for service providers of TBSS and confidential TBSS in terms of technology implementation, employee training, kiosk environment planning, and recovery from technology failures.

Specifically, all hypotheses related to *recovery* were supported. In other words, recovery *during* TBSS failure (whether the failure was caused by the user or the technology) reduced all types of negative attributions – to the store, to its employees, and to the technology – and increased user satisfaction. Thus, this study shows service providers the critical importance of ensuring that everything possible is done to achieve recovery from the TBSS failure, in general, and especially for confidential TBSS systems.

From a managerial perspective, ensuring recovery from technology failures may take many forms. Our study suggests that it is critical that managers implement robust and reliable technologies to eliminate as many errors as possible and to be able to recover from errors generated by the system or by users. At the same time, no technology is completely foolproof. With respect to this, our study also informs service providers that if errors do occur, recovery can also be achieved if there are some employees available who are trained to achieve recovery. This means that service providers need to find and properly train at least a few employees in each store so that they can be ready to help and resolve a problem immediately after it occurs.

The majority of hypotheses related to *the anxiety level created by the kiosk environment* were also supported. In planning this study, the authors had reviewed a number of actual TBSS systems, including job application kiosks, to gain perspective on possible situational variables that managers should be concerned about. It appeared that TBSS systems, in general, and confidential TBSS systems, in particular, demanded excessive attention from users, and as a result, background noise or crowded conditions created more distractions and stress for TBSS users. Therefore, this idea was incorporated into the experimental design, and the results confirmed that compared with high-anxiety environments, low-anxiety environments greatly reduced negative user attributions toward the store and its employees and increased user satisfaction.

The implications for service providers are that they should take measures to reduce anxiety levels for TBSS users, especially those individuals interacting with confidential TBSS systems. Study participants who had experience with job recruitment kiosks mentioned that these kiosks were often placed in busy aisles, at store entrances, near checkout registers, and at other locations that hampered their ability to concentrate. Locating kiosks in less busy areas, but where assistance is still readily available, would help minimize

anxiety for customers or users who are likely to be already stressed due to the nature of the encounter. Based on the experimental treatment for anxiety level in this study, another way to reduce user anxiety would be to have dedicated phones placed near the kiosks so that users can call easily for help if needed without leaving their private information exposed on the screen. If crowded environments are the norm for a particular retailer, that store's managers should consider adopting an Internet model for job applications that would allow users to input personal information in the privacy of their own homes, possibly combined with scheduled in-store applications conducted in a private office space for personality evaluations and similar assessments.

Employee assistance (apart from whether recovery occurred or not) was also found to play a key role during failure/recovery, a useful insight for all types of TBSS, and even more so for confidential TBSS systems. Ensuring that customers or users can quickly and easily ask for assistance appears to be crucial. Despite the self-service nature of the encounter, interpersonal interaction appears to assuage negative experiences and enhance assessments of encounter satisfaction. Therefore, employees charged with assisting TBSS users, in general, and confidential TBSS system users, in particular, *should be cognizant of user frustrations* and readily offer assistance in such cases, instead of assuming that TBSS customers/users always wish to avoid interaction with employees.

The *interaction effects* found in this study suggest or reinforce a number of managerial implications. One such effect shows that if the system recovers by itself, users are pleased not to have had employee assistance and readily reduce their negative attribution to the kiosk. This finding underscores the earlier recommendation that retailers and service providers implement a robust and reliable technology that can recover by itself whenever possible to reinforce the 'self-service' aspect of the experience. At the same time, a second interaction effect provides further substantiation for another earlier finding that when the system does not recover by itself, employee assistance is appreciated and results in reduced negative attributions to employees.

A third interaction effect shows that when the failure is a result of user error, recovery (whether by the system itself or with an employee's help) lowers negative attributions to the store. However, as user error typically cannot be predicted, this finding underlines the need for managers to figure out possible errors customers or users might make and be poised for recovery either through the system or through a few well-trained employees. The last interaction effect shows that user satisfaction is enhanced with recovery in a low-anxiety environment, reinforcing the importance of providing a low-anxiety environment around the kiosk by placing the kiosk in a quiet part of the store, yet with access to employee help if needed, and having a phone handy.

Limitations and future research

While every effort was made to make the experimental scenarios as realistic as possible – and reality checks seem to support this – laboratory experiments will always be less realistic than field experiments. Yet, in the classic trade-off between these two types of studies, laboratory or scenario-based experiments offer control over extraneous factors and the ability to precisely manipulate treatments – which make them an ideal choice for theory building. Secondly, TBSS encounters are highly interactive experiences that may be subject to additional situational and dispositional variables, not captured in this study. Future research could conduct field experiments to better investigate such issues, although it may be difficult to get store approval for these studies or user agreement to

participate, especially for confidential TBSS systems, and will mean giving up the level of control possible in scenario-based experiments.

Given that job recruitment kiosk encounters are predicated on a potential employer/employee relationship, it is possible that the context may have amplified the respondents' feelings toward the technology, employees, and the store after a TBSS failure. Whereas this makes the findings directly useful for theoretical and managerial implications related to confidential TBSS systems, some of the findings may not have emerged with a simpler TBSS system such as using automated teller machines (ATMs). At the same time, most of the findings in this study seem to resonate with anecdotally shared customer issues that arise in the use of checkout self-scanners, in-store kiosks, and even ATMs.

Attributions to sources related to the service provider were the focus of this study; self-attributions versus other attributions were not compared. There does not seem much practical benefit to service providers in having customers or users blame themselves after a TBSS failure, because even though they may not blame the provider as much, they will associate negative feelings with the experience, which may make them reluctant to interact with that provider in the future. Instead, this study investigated how the user's negative attributions to the provider (i.e. to the store, to its employees, and to the technology employed by the store) could be reduced, so as to provide direct and actionable practical implications. Future research could investigate self-attributions by adding them to the framework in this study to extend attribution theory further.

In measuring attribution to the kiosk, the reliability of the two items together was under 0.5 and, therefore, deemed unacceptable. On examining the data for the two items as well as running factor analysis on all the items with each of these two items included separately, it appeared that one item was performing poorly but that the other was sound. It is not clear why this one item performed poorly because it was worded similarly to items for attribution to the employee and to the store. Only the item that performed well was used in subsequent analysis and, as a result, Cronbach's alpha could not be gauged for the construct. Nevertheless, using the one sound item increased confidence in the rest of the results and was a better solution than using two items which did not reliably represent a construct together. Future research should consider using three or four items for each construct, and so if this type of inexplicable situation occurs for a particular item, there will be a sufficient number of items left to compute reliability.

Another possible limitation is that 34% of the sample did not have actual experience using job recruitment kiosks. To check if there might be differences based on this, the entire model was re-run with only 242 respondents, those who had used such kiosks. The reassuring outcome was that the same hypotheses were still supported (or not) as with the full sample. Given that cell sizes were uneven with the smaller sample, the results reported are from the full sample. Future research could use actual experience as a screening question and plan for a larger sample of experienced users to eliminate any concern about respondents' lack of experience.

This study focused on job recruitment kiosks because they are being widely used and yet they are similar in many respects to typical TBSS systems. Future research could study issues that apply only to confidential TBSS systems such as privacy and security of information. Such studies may reveal other insights if the nature of the required confidential information is even more personal (e.g. medical histories).

Frustrating user interfaces and unreliable hardware in TBSS systems have the potential for a negative impact beyond the immediate experience. For example, some study participants who had direct experience with job recruitment kiosks mentioned that they were so frustrated by failures of these systems that they even stopped shopping at those stores as

customers. Given that it is becoming more common for individuals to seek employment at their favorite stores (Cullen, 2005), retailers might risk losing loyal customers as well as potential employees due to technology failures in their TBSS systems or the inability to recover quickly from such failures. This type of spillover effect on customer loyalty is worth studying in future research.

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Appendix 1. Research design

Scenario	Failure recovery	Anxiety level	Source of failure	Employee assistance
1	Yes	High	Customer/user	No
2	Yes	High	Customer/user	Yes
3	No	High	Customer/user	Yes
4	No	High	Customer/user	No
5	Yes	High	Kiosk	No
6	Yes	High	Kiosk	Yes
7	No	High	Kiosk	Yes
8	No	High	Kiosk	No
9	Yes	Low	Customer/user	No
10	Yes	Low	Customer/user	Yes
11	No	Low	Customer/user	Yes
12	No	Low	Customer/user	No
13	Yes	Low	Kiosk	No
14	Yes	Low	Kiosk	Yes
15	No	Low	Kiosk	Yes
16	No	Low	Kiosk	No

Appendix 2. Measures used in the study

Realism checks (Seven-point Likert items taken from Dabholkar, 1994)

It was easy imagining myself in the scenario situation.
 The scenario situation was realistic.

Manipulation checks (Forced-choice, dichotomous items developed for this study)

Error source

The source of the error I encountered was the kiosk.
 OR The source of the error I encountered was my own actions.

Assistance

I received employee assistance.
OR I did not receive employee assistance.

Error resolution

The error I encountered was resolved.
OR The error I encountered was not resolved.

Anxiety level

The location and set-up of the job application kiosk created a situation with low anxiety.
OR The location and set-up of the job application kiosk created a situation with high anxiety.

Negative attribution (Seven-point Likert items developed for the study)

Respondents were asked the extent to which they blamed different targets associated with the service provider for *lack of recovery from the failure*. (R) = reverse-coded.

To kiosk

- The kiosk was unable to fix the error that was created.
- The kiosk resolved the error on its own. (R)

To employee

- No employee resolved the error that was created.
- Employee assistance satisfactorily resolved the error. (R)

To store

- The store's set-up of the job application process prevented the error from being resolved.
- The store's set-up of the job application process allowed the error to be fixed. (R)

Satisfaction

Seven-point, semantic differential items modified from

Dabholkar and Thorpe (1994):

Compared to an ideal job application experience, the experience described in the scenario would make me feel. . .

very displeased – very pleased,
very unhappy – very happy,
very dissatisfied – very satisfied,
disgusted – delighted.

van Dolen et al. (2007):

Thinking back to my experience in the scenario, I would feel satisfied at the conclusion of this job application process.